# Scenario Analysis: A Solution to Corps' Thorniest Planning Problems?

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# Landscape Scale Studies

- Global importance
- Affects billions of people
- Great variety of wickedly complex problems
- Ecosystem restoration-the Corps new mission?
- Not well served by traditional planning and analytical methods

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# For Example

- Upper Mississippi and Tributaries
- Muskingum Watershed Conservancy District
- Puget Sound
- Columbia River
- Coastal Louisiana
- Everglades
- Complex and expensive!

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# What's the Without Condition?

- It is critical to plan formulation
- It is critical to plan evaluation
- It is a source of adversarial processes
  - See Washington Post vs. COE--Upper Miss
- And you do not know what it is!

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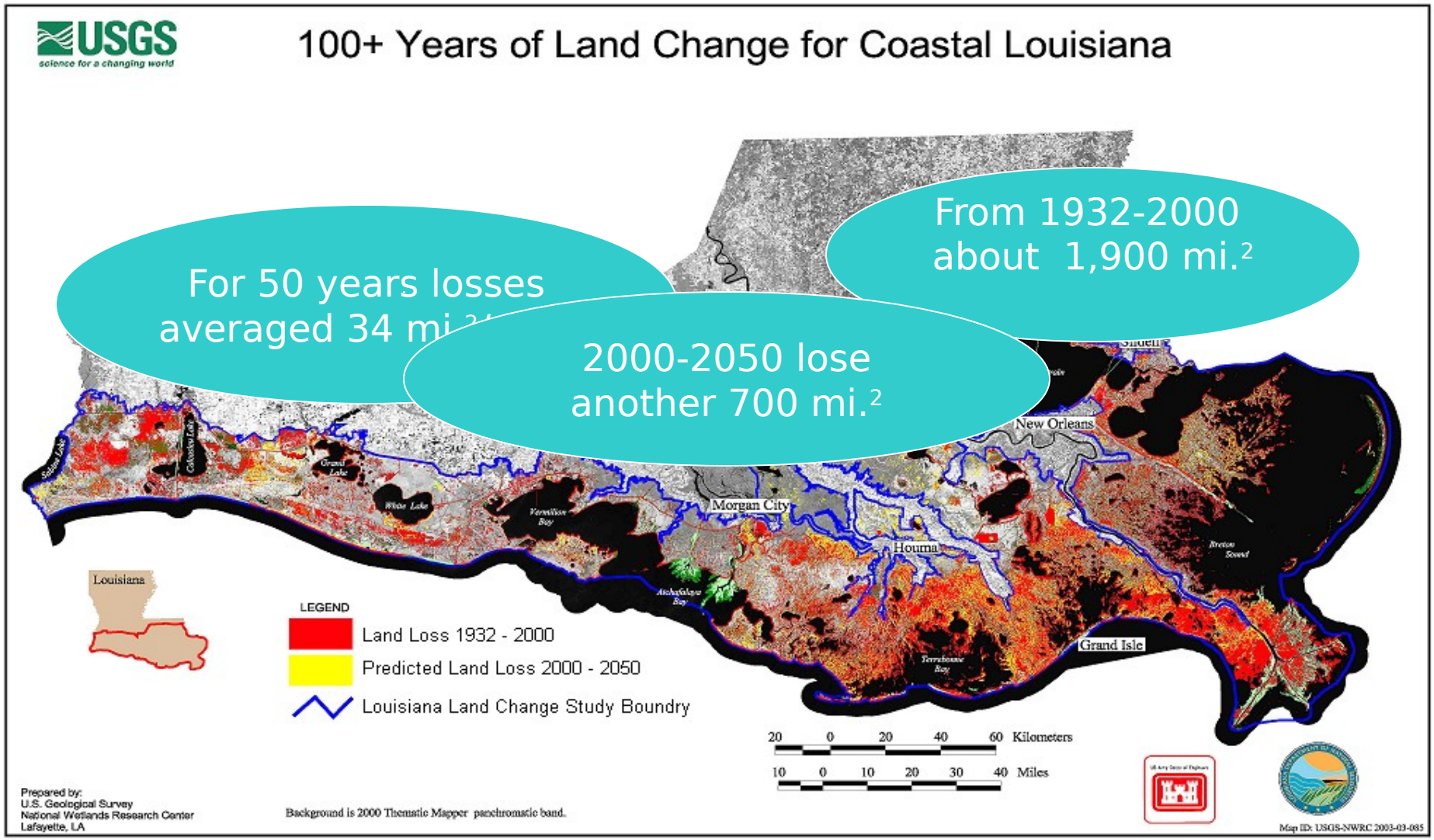


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# Causes

- Natural
  - Subsidence
  - Sea-level rise
  - Erosion
  - Salt water intrusion
  - Barrier island degradation
  - Storms
- Human
  - Drainage for agriculture
  - Mineral extraction
  - Canal construction
  - Flood control levees prevent river from changing course- Mississippi River can’t seasonally nourish wetlands

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# Impacts

- Energy &
- urism &
- reation
- iculture
- od & storm
- tection

fisheries
- Shellfish
- Finfish

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# Barrow Coastal

**Even small projects can be complex!**

# Problem Statement

- *“Barrow’s way of life is intrinsic to its location. Erosion and coastal storms threaten the modern infrastructure essential to the social fabric that the community of Barrow provides as a regional cultural center.”*

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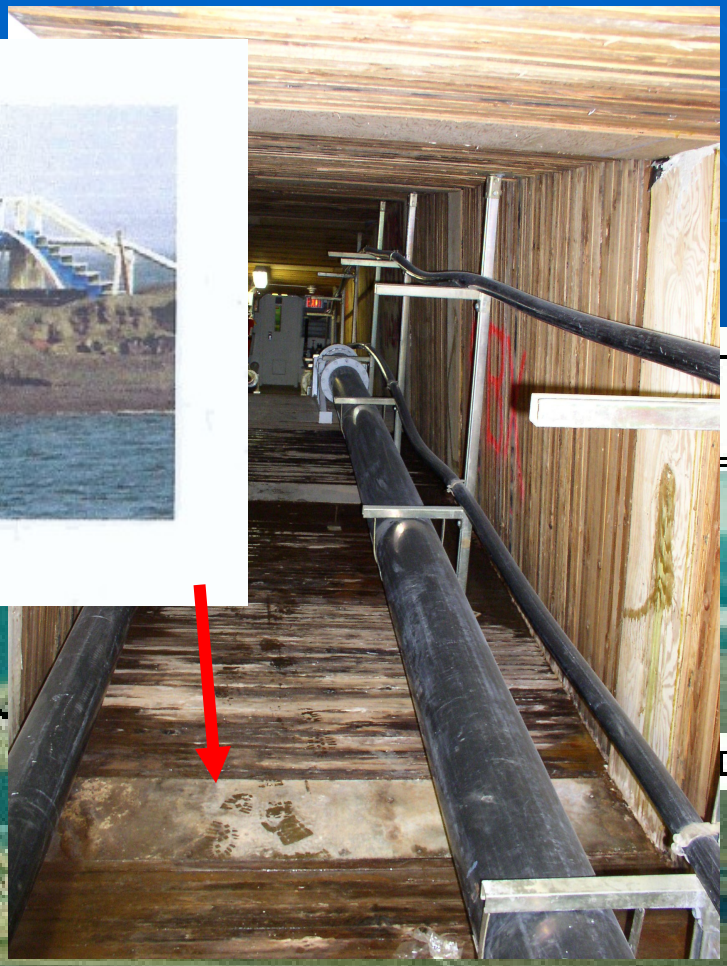

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# Change

- Storms and erosion
  - Global warming
  - Less ice cover- major issue
- Social & economic infrastructure
- Cultural consequences

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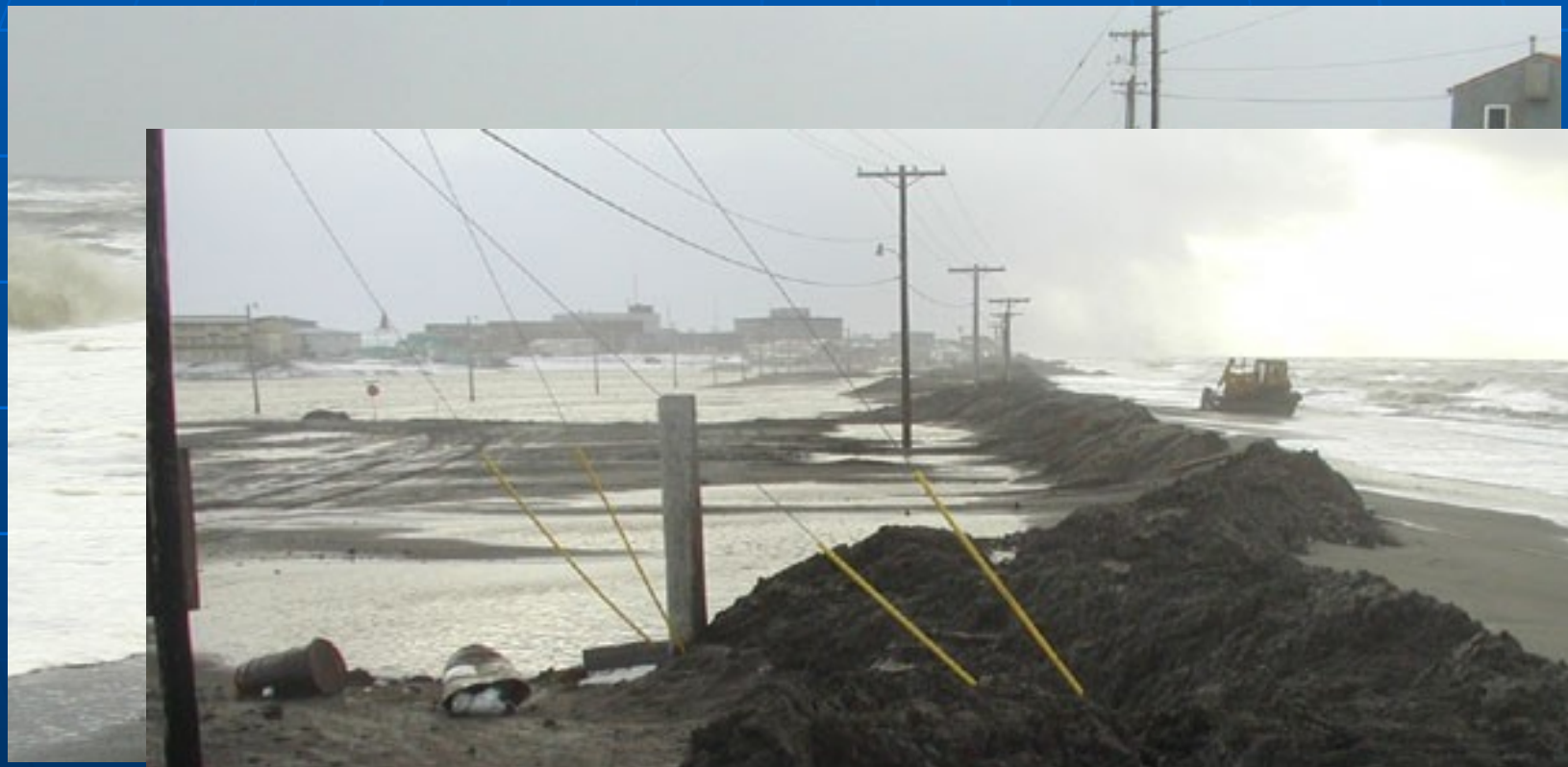
# Local Effort to Secure Coast



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# The World is Uncertain

- Complexity
- Pace of change
- Know unawareness
- Pressure on costs
- Irreversible consequences
- Responsibility
- Public perception
- Possible/existence
- 1D Problems rare
- Decisions often subjective

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# Fact

- Uncertainty adds to the risk of our decision making
  - Wrong decision=>wrong output=> wrong outcome
- We need effective methods for dealing with uncertainty and for managing these risks

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# Decision Tools for Uncertain & Subjective World

- Realistic and useful planning frameworks--Scenario Planning
- MCDA--a useful evaluation tool

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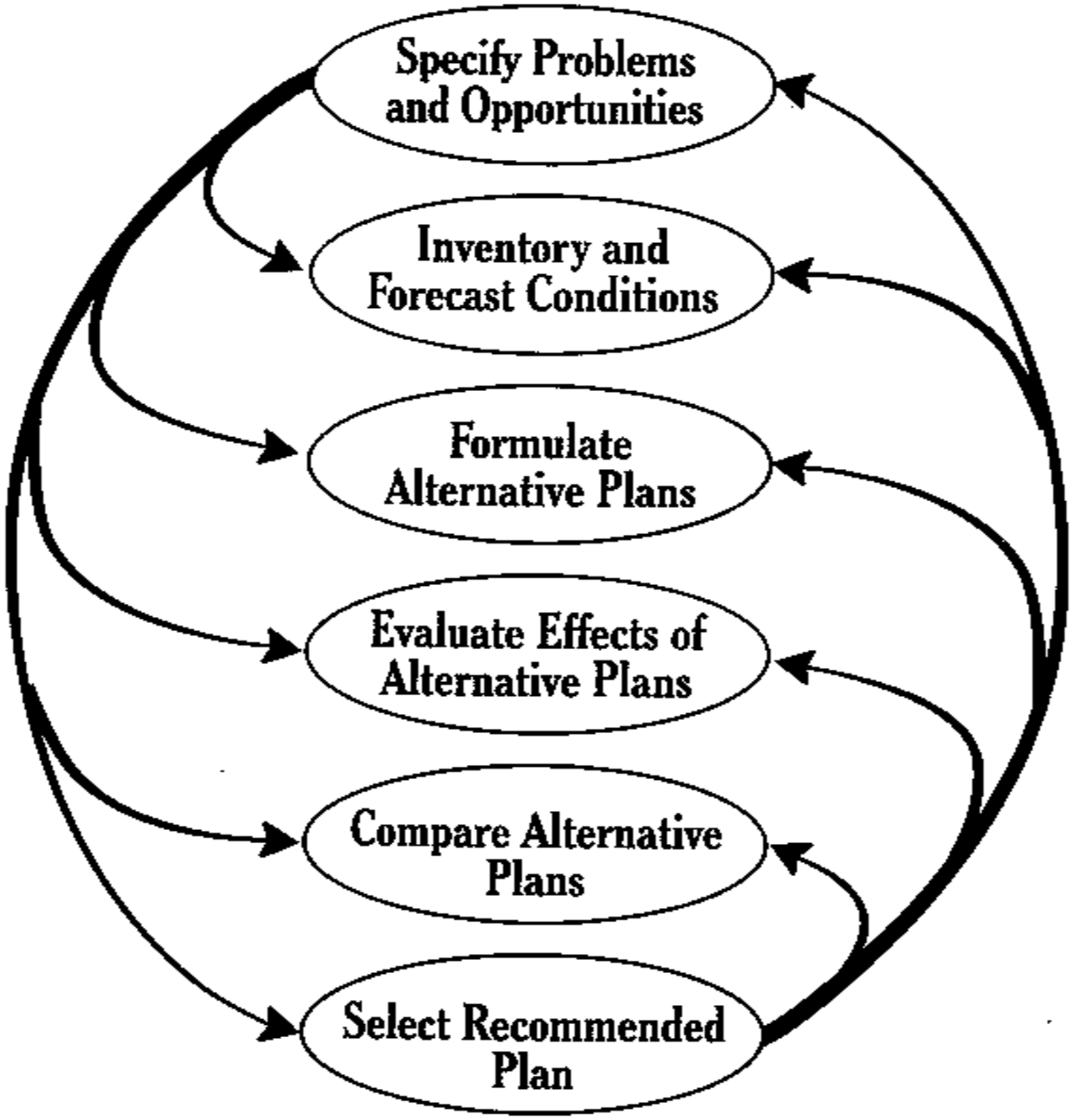
# PLANNING PROCESS



# Traditional Planning

- It’s largely deterministic
- Process relies on a single most likely alternative future forecast
  - Desire for single right answer
  - Often anchored in present
  - Adversarial--legitimate differences in views of uncertain future

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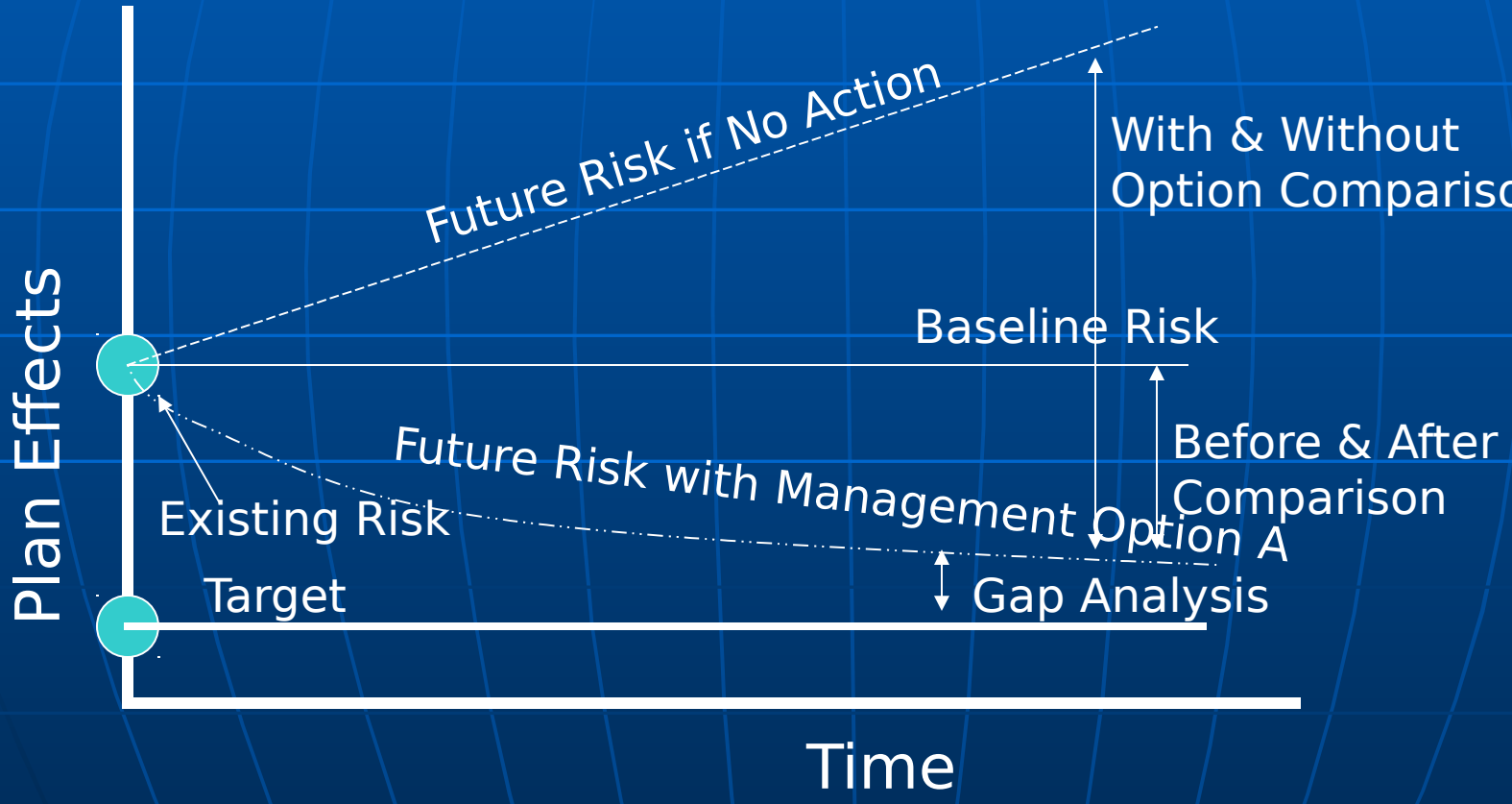
# Forecasting & Comparing Criteria

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# Most Likely Future Condition

- We labor in uncertainty
- A single forecast of the future will be wrong
- Thus, planning is based on what could be not necessarily what will be
- What could be is wide open to debate
  - We cannot ignore it

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# Complex Studies

- Need planning framework that addresses uncertainty explicitly
- Wide variety of ecosystem restoration issues face large uncertainties
  - Natural causes
  - Global warming
  - Storm regimes
  - Anthropogenic disturbances
  - The “with condition”
- Scenario planning can help

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# Scenario Planning

- Developed in second half of 20th century (Europe)
- Result of failure of traditional planning
  - Deterministic view of future
  - Forecasts were wrong

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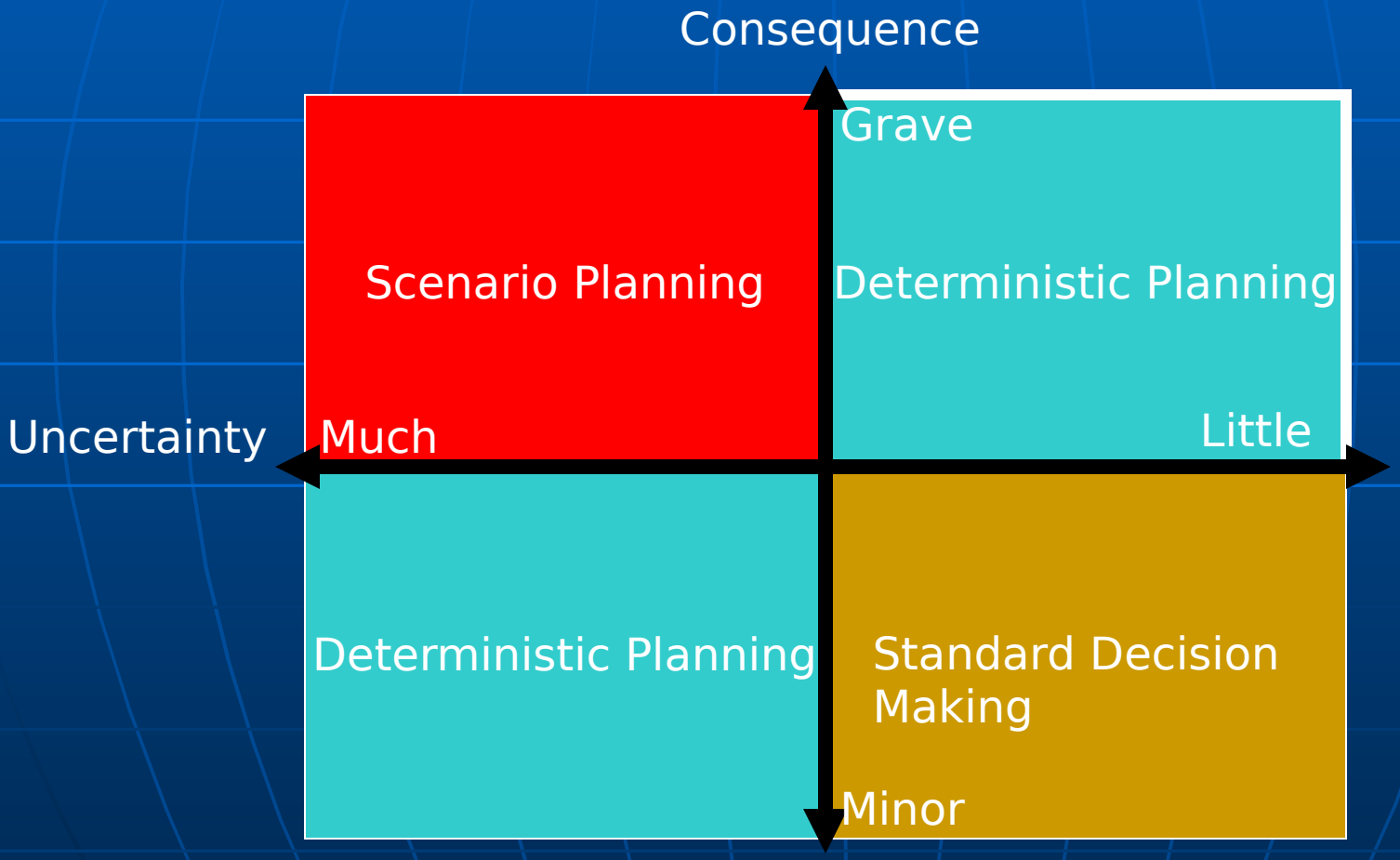
# When to Use Scenario Planning

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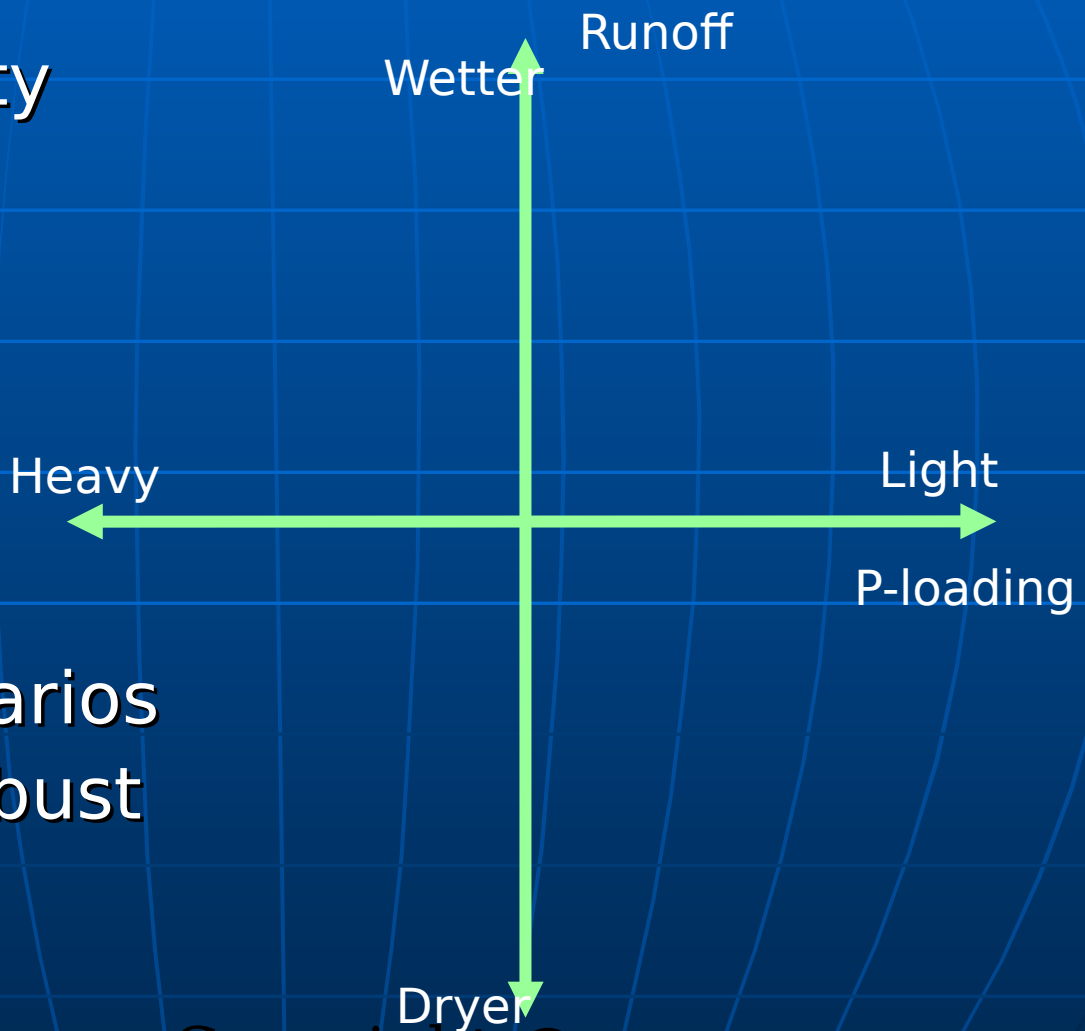
# Quick Overview

- Much uncertainty
  - ID drivers
- Identify future scenarios
- Do analysis (good science)
- Evaluate plans against all scenarios
- Choose most robust plan

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# Multiple Criteria

- Collaborative Planning
  - NED
  - EQ (NER)
  - RED
  - OSE
- Archeological
- Cultural
- Economic
- Engineering
- Environmental
- Political
- Social

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# MCDA

- MCDA necessary to support evaluation of plans
- Separate MCDA for each scenario

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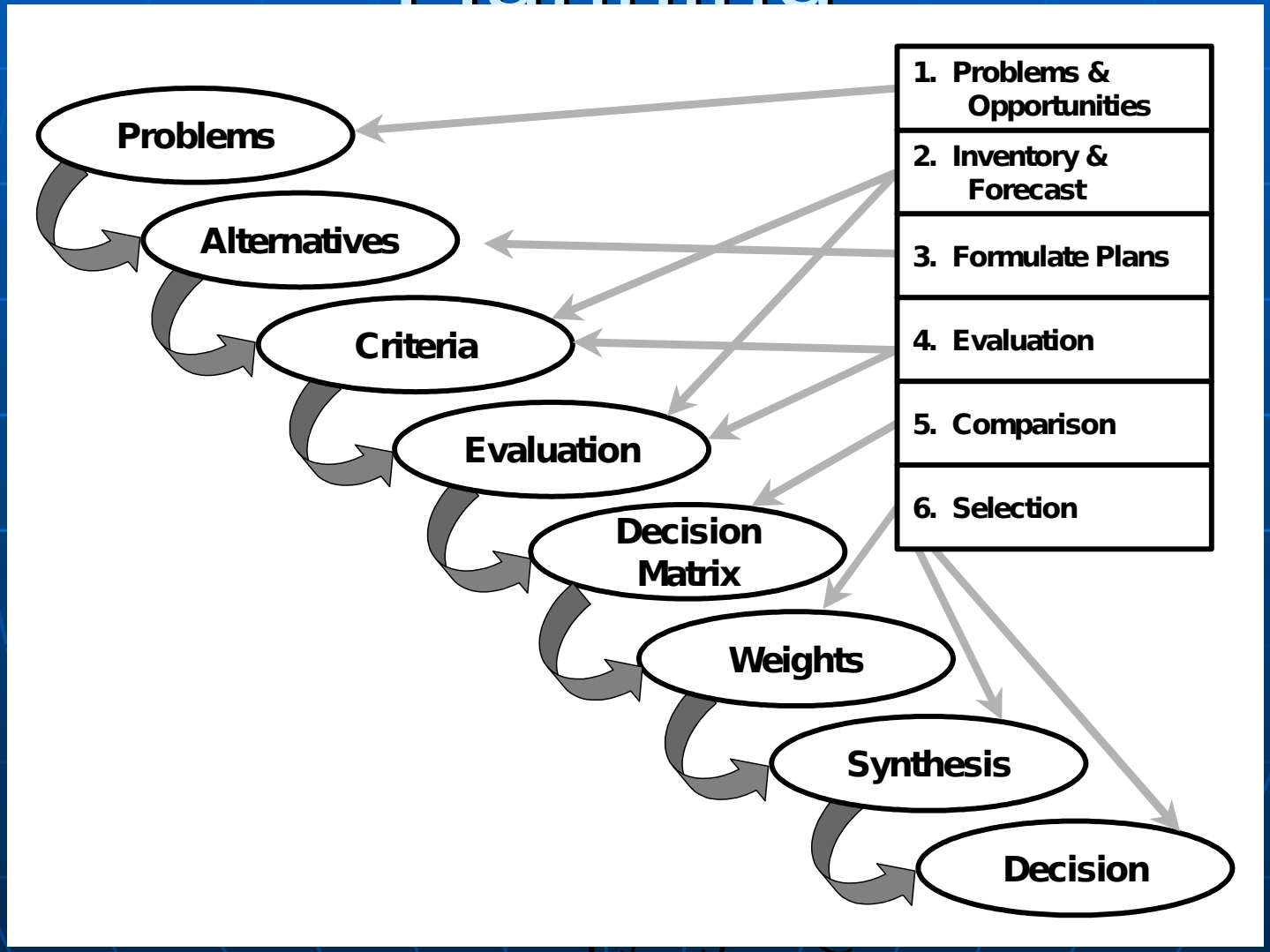
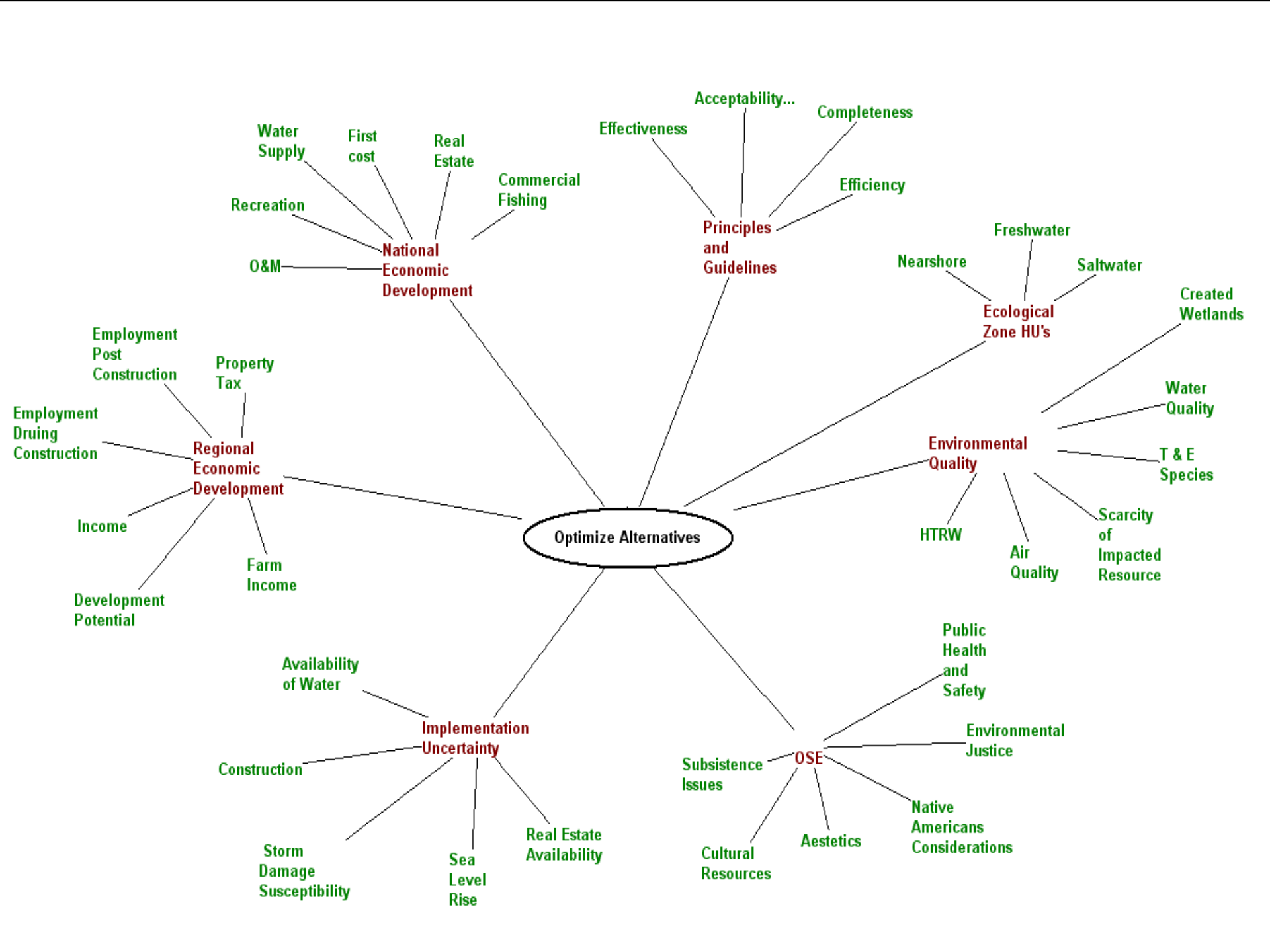
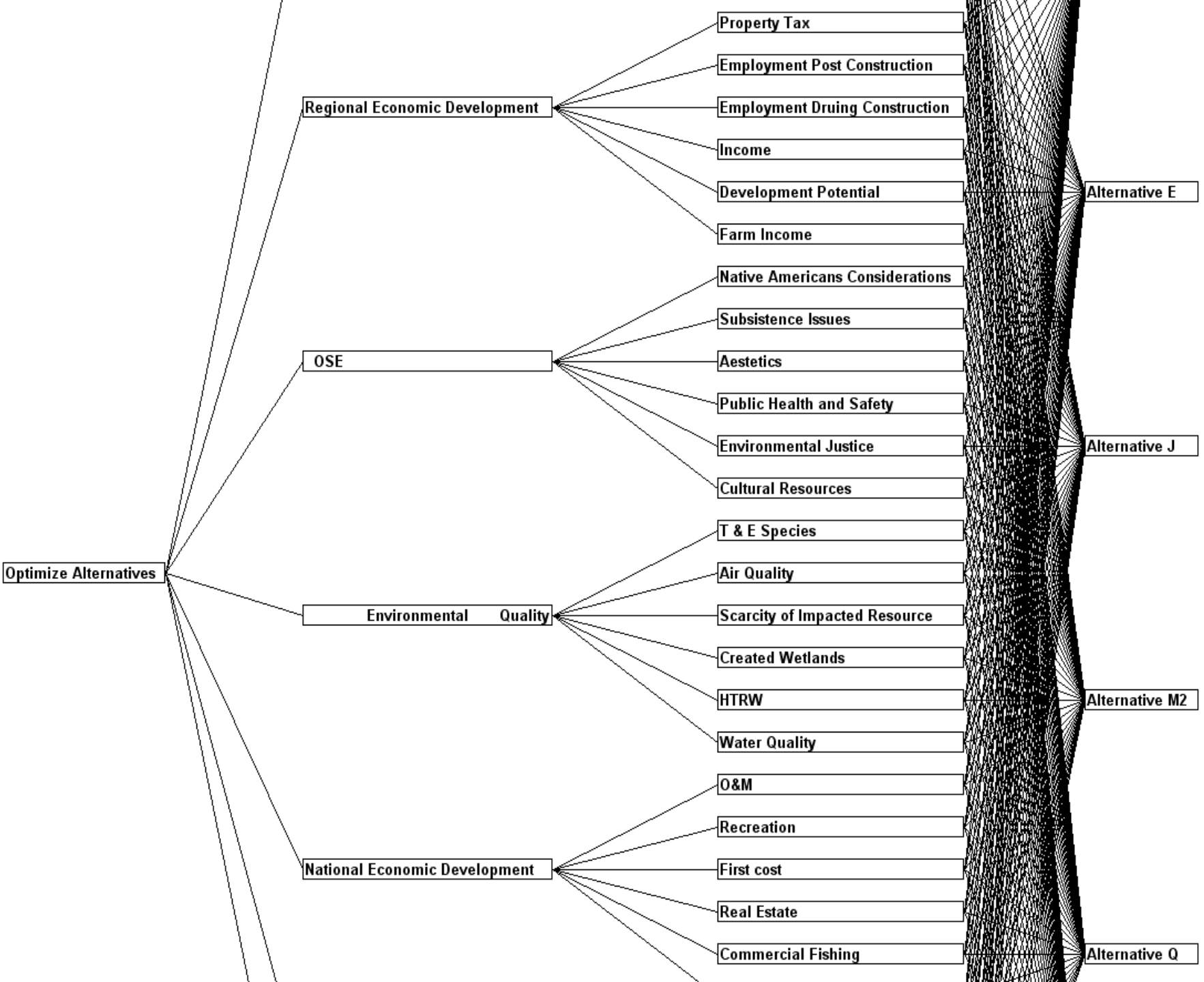
# MCDM Framework & Planning




Optimize Alternatives
National Economic Development
Water Supply
First cost
Real Estate
Commercial Fishing
Recreation
O&M
Principles and Guidelines
Acceptability...
Completeness
Effectiveness
Efficiency
Ecological Zone HU's
Freshwater
Nearshore
Saltwater
Environmental Quality
Created Wetlands
Water Quality
T & E Species
Scarcity of Impacted Resource
Air Quality
HTRW
Regional Economic Development
Employment Post Construction
Property Tax
Employment Druing Construction
Income
Farm Income
Development Potential
OSE
Public Health and Safety
Environmental Justice
Native Americans Considerations
Aestetics
Cultural Resources
Subsistence Issues
Implementation Uncertainty
Availability of Water
Construction
Storm Damage Susceptibility
Sea Level Rise
Real Estate Availability


Optimize Alternatives
Regional Economic Development
OSE
Environmental Quality
National Economic Development
Property Tax
Employment Post Construction
Employment Druing Construction
Income
Development Potential
Farm Income
Native Americans Considerations
Subsistence Issues
Aestetics
Public Health and Safety
Environmental Justice
Cultural Resources
T & E Species
Air Quality
Scarcity of Impacted Resource
Created Wetlands
HTRW
Water Quality
O&M
Recreation
First cost
Real Estate
Commercial Fishing
Alternative E
Alternative J
Alternative M2
Alternative Q

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# Two Basic Ways to Proceed

- Evaluate each plan against each of the four scenarios (using MCDA results)
  - Sum scores across scenarios
- Results of this evaluation compared across plans for the purpose of selecting a plan
- Which plan does best (robustness) regardless of the future realized?

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# Two Basic Ways to Proceed

- Choose one of the four scenarios as most likely
- Proceed as usual through the selection process
- Evaluate the recommended plan against the other three remaining scenarios
- Unacceptable results in any scenario
  - Adaptive management
  - Reformulate
  - Another plan is selected

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# Who’s Doing It?

- Industry
- Europe
- COE

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# Take Away Points

- Landscape scale problems complex & diverse
- Uncertainty is everywhere
- Scenario planning to address uncertainty
- MCDA needed to address complexity & collaborative planning initiative
- Scenario analysis--MCDA in scenario planning context is a potential solution

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